



CLT²

PHOENIX HOUSE

A SUPPORTIVE SERVICES

HOME

FOR THE RECOVERY AND LIFTING UP OF
A COMMUNITY MEMBER IN NEED

**HOW TO DESIGN
AN AFFORDABLE,
DIGNIFIED,
DURABLE, AND
SUSTAINABLE
HOME
FOR THOSE
TRANSITIONING OUT OF
HOMELESSNESS?**



The Homelessness Crisis

The number of individuals experiencing housing insecurity is on the rise in cities across the United States, and municipalities are struggling to address this humanitarian crisis.

Lawrence, Kansas is a college town with a population of just under 100,000. Like many communities, homelessness is surging; however, the community is taking progressive action, such as recently opening a tiny home pallet village, or conducting extensive point-in-time (PIT) accounting of those experiencing homelessness. Lawrence has become a model for other communities, but has also become a common location for so-called “dumps”, when a legally-responsible party discharges an individual into another community. The county’s 2024 PIT data shows that the area has 15% of the total statewide count of people experiencing homelessness. In fact, homelessness has risen 18% since 2023. Clearly there is more to be done.

One local non-profit organization, Tenants to Homeowners, a **community land trust (CLT)**, has been working to address affordable housing for more than thirty years, helping more than 400 families become homeowners, providing affordable rentals, and reaching more than 350 people annually through home-buyer education workshops. Their mission has recently expanded to address the homelessness crisis. While immediate shelter is often a necessary pre-condition to recovery, reacclimating to living autonomously can often take time and supportive services.

In reaction to this growing need, the University of Kansas began working with Tenants to Homeowners to provide designs for small, supportive service housing. The goal is to provide one new design each year, and to build one example of each design. Once individuals are provided safe haven in temporary housing, they have a sustainable and dignified path to recovery. Phoenix House is the first project in the collaboration, designed and built by architecture students.

“It is hard to argue that housing is not a fundamental human need. Decent, affordable housing should be a basic right for everybody in this country. The reason is simple: without stable shelter, everything else falls apart.”

— Matthew Desmond, *Evicted: Poverty and Profit in the American City*

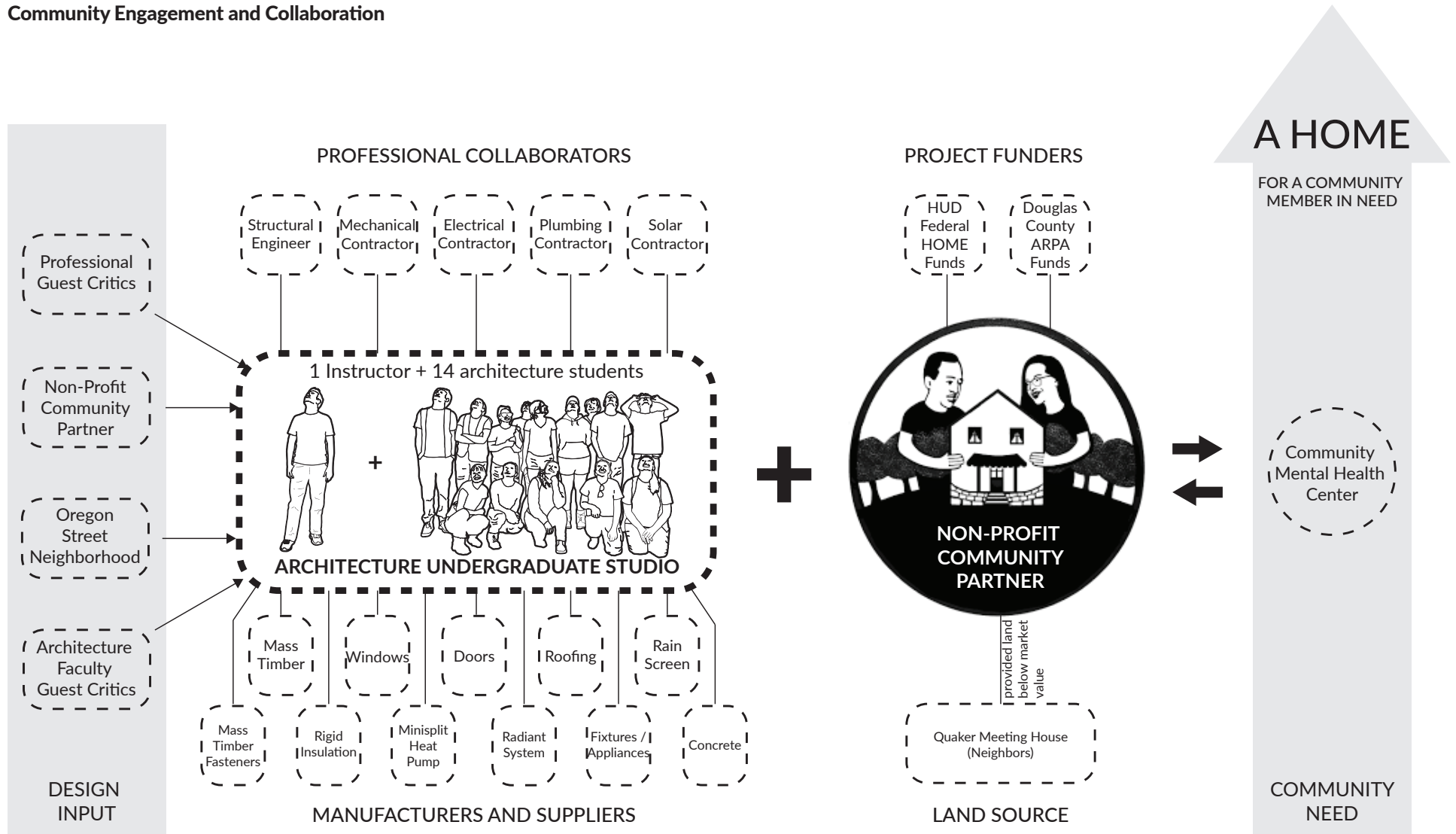


a photograph of members of Tenants to Homeowners standing in front of a recently completed affordable home



excerpted/modified from “A Place for Everyone”, by Douglas County and the City of Lawrence, showing the Housing Needs Continuum

Community Engagement and Collaboration



a diagram depicting the the anatomy of collaboration, including: the studio, our community partner, the local community mental health center, government funders, neighborhood residents, professionals, manufacturers, and suppliers.

“This partnership exemplifies how innovative design, education, and service-based learning can be advanced through public/private partnerships. Through Phoenix House, our organization has the unique opportunity to learn from these young, enthusiastic designers. The designers in turn, are offered a glimpse into the world and work of affordable housing from us, their community partners. When the designers of tomorrow are informed by the struggles of today, their work can’t help but to be infused with empathy. A great partnership to say the least.”



a neighborhood map showing Phoenix House (in red), the closest bus stops, and walkable amenities such as parks and trails, a community garden, an elementary school, a middle school, and a community orchard

Phoenix House

Completed: July 2024

Faculty / Lead Designer: Chad Kraus

Community Partner: Tenants to Homeowners

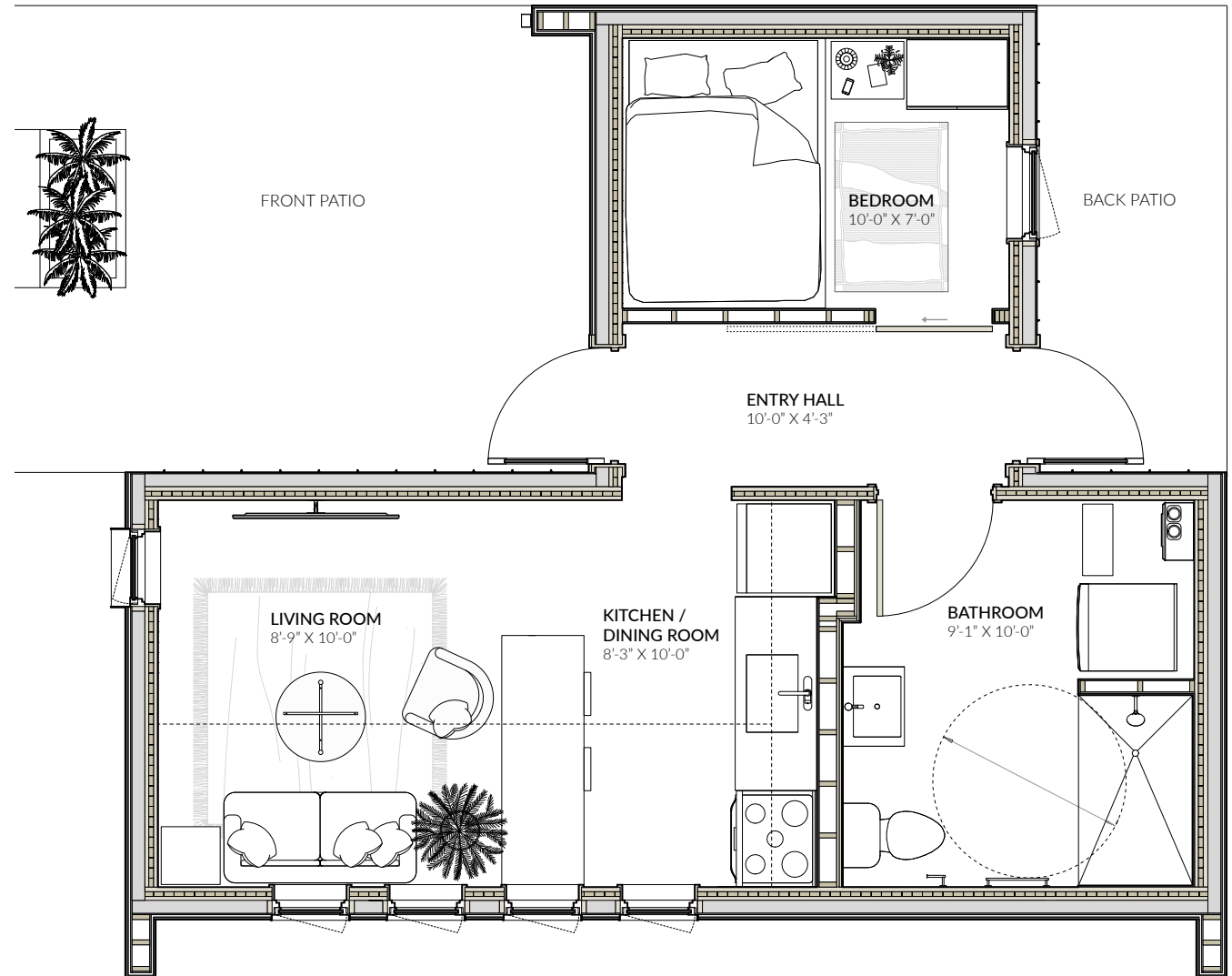
Students: Grace Beirne, Julia Bond, Corrie Bolton, Morgan Campbell, Makenna Dawson, Hayley Ford, Reese Gilmore, Aidan Hall, Alyda Hunnicutt, Morgan Kime, Spencer Landis, Adin Mehanovic, Samantha Weidner, Amanda Willen

Consultants and Subcontractors: Apex Engineers; Hicks Concrete; Frank Rhodes Electric; Westerhouse HVAC; Kastl Plumbing; Ra Power

Phoenix House is a 400 SF, solar-powered, mass timber home designed to assist members of our community transitioning from homelessness to dignified and sustainable housing. This home has been designed using a **cross laminated timber (CLT)** shell, wrapped in a highly-insulated and air-tight building envelope, and clad with a wood rainscreen.

The home's interior features durable materials and surfaces, including exposed CLT walls and ceilings and exposed concrete floors with radiant floor heating. Wood surfaces were prioritized due to recognition, supported by numerous recent studies, that wood materials provide documented physiological and psychological benefits, including regenerative and stress reduction outcomes, through the appealing aesthetics of color, tactility, smell, humidity-regulation, and indoor air quality.

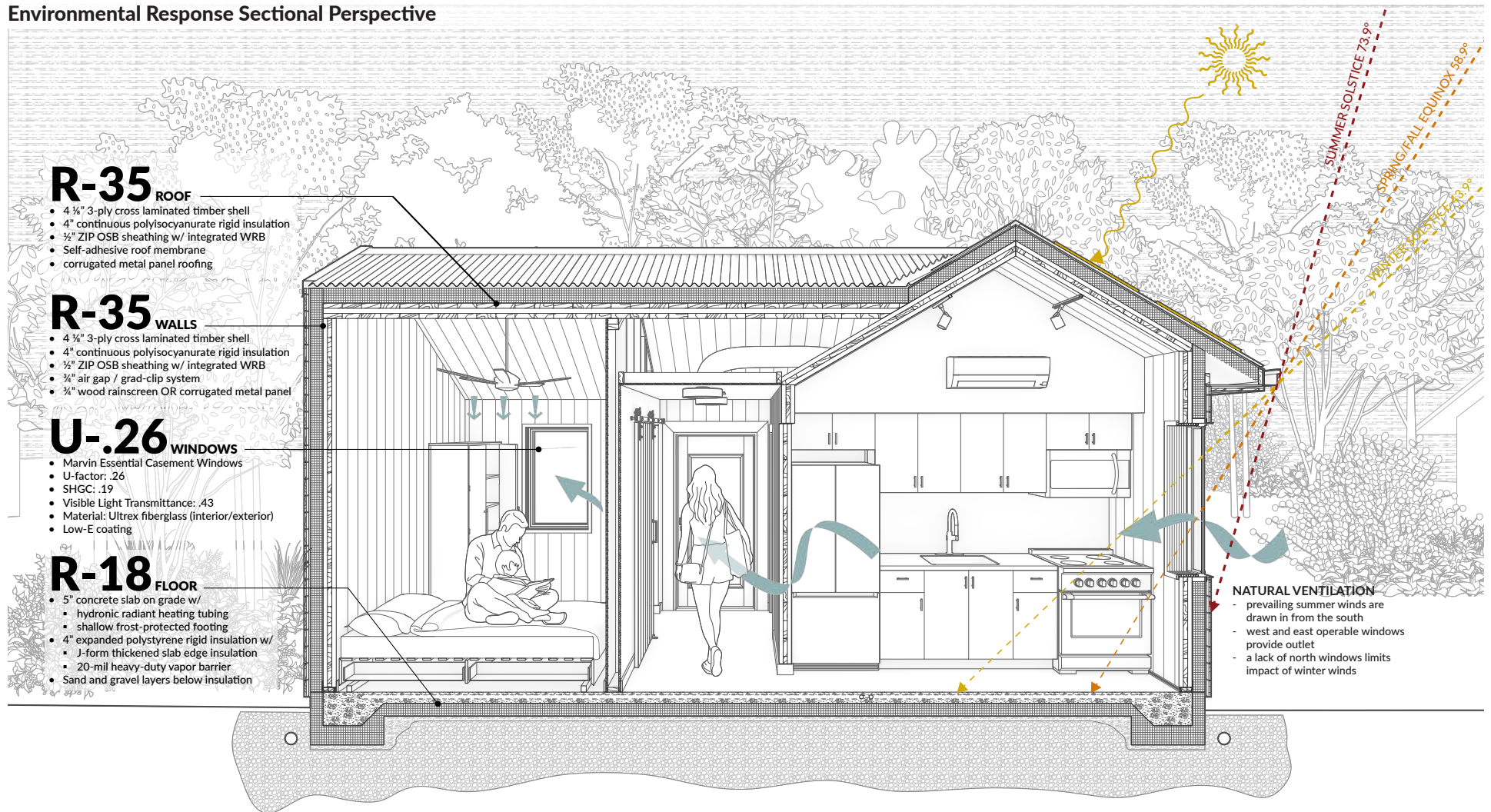
Phoenix House's high-performance thermal envelope is complemented by a mini-split heat pump, energy recovery ventilator, radiant floor, low-flow fixtures, and a rooftop solar array. The result is a surprisingly spacious, resilient, and comforting home, all with low projected operating costs.



“Working on Phoenix House has been a fulfilling experience and opportunity to give back to the local community and work directly with people in the neighborhood. The process of designing and building an affordable home has presented many challenges, but has also provided unforgettable experiences, such as working with peers, engineers, suppliers, and partnering with Tenants to Homeowners to make a one-of-a-kind affordable small home.”

— Reese Gilmore, one of architecture students on the team

Environmental Response Sectional Perspective



Cross laminated timber (CLT) was chosen, despite higher initial costs, for its: 1) durability (minimizing drywall to lower repair time/costs between tenants); 2) physiological and psychological benefits, as wood surfaces have been shown to reduce anxiety and contribute to mental wellbeing; 3) panelized construction, resulting in the rapid erection of home's shell; and 4) low embodied energy and carbon sequestration, serving as a model for sustainable design at larger scales. Coupled with this carbon sequestration strategy, the energy efficient design of Phoenix House not only represents good stewardship of the natural environment, our community partner appreciated the long term cost savings associated with lower operational costs. Six rooftop solar panels are projected to generate most of the home's energy needs.

The resulting building envelope is straightforward. Continuous insulation, coupled with the CLT shell, resulted in R-35 walls and roof, exceeding minimum code requirements for the wall and, through performance modeling, easily achieved code-mandated performance for the roof. The concrete slab-on-grade, with integrated radiant floor heating, was cast into a J-form of EPS foam with ample under-slab insulation, allowing the use of a less expensive and more sustainable, shallow, frost-protected footing. Lastly, the gable form of the home not only fits well into its neighboring context, but appropriately-sized eaves optimize daylight and winter heat gain while limiting the risk of overheating in the summer.



Exterior renderings (top) of the west facade (left) and the southwest corner (right); interior renderings (bottom) of the living/dining/kitchen looking east (left) and looking west (right)



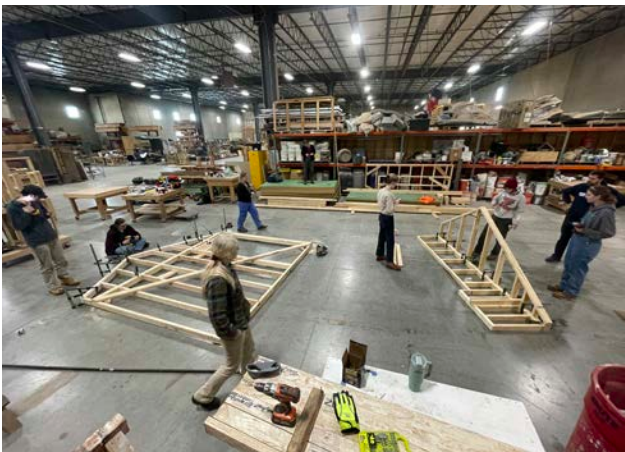
students visit the site and meet our community partner



students present a series of design charettes to stakeholders



stakeholders provide iterative feedback and discussion



pre-fabrication of interior partitions and soffits



mocking up interior partition walls



prefabrication of custom kitchen island/dinning bar



preparing the site for a neighborhood block party



installed foundation insulation and radiant tubing



studio photograph, post concrete slab pour

CONSTRUCTION: CROSS LAMINATED TIMBER ARRIVAL AND INSTALLATION



eleven cross laminated timber panels arrive



an aluminum base system is installed and leveled



cross laminated timber panels are install, one-by-one



pre-fabricated interior partitions are installed as well



the final cross laminated timber wall panel is being installed



a cross laminated timber roof panel is lifted into place



the cross laminated timber roof and wall panels are fastened



the final cross laminated timber roof panel is being installed



cross laminated timber shell in place with minor adjustments

CONSTRUCTION: EXTERIOR PROGRESS, FROM CLT SHELL TO RAINSCREEN



finishing attaching the cross laminated timber roof panels



finalizing rough openings in cross laminated timber



installing roof eaves, window bucks, and exterior insulation



installing ZIP sheathing and continuing to install insulation



installing windows and enclosing wing walls and eaves



building envelop is fully waterproofed and air sealed



rainscreen clip system installed and rain screen beginning



rain screen installation continuing



rain screen almost completed, regrading the site

CONSTRUCTION: INTERIOR PROGRESS, FROM CLT SHELL TO PUNCHLIST



the cross laminated timber shell is complete



partitions, soffits, electrical, and plumbing are installed



windows and doors are installed



all windows installed, steel tie rods installed



framing, windows, doors, and MEP rough-in complete



drywall is installed, mudded, and CLT walls clear coated



drywall wall is finished and sanded, cabinetry installed



painting, trim installation, countertops, MEP finishing



punchlist and prepping for appliance/equipment installation



Exterior view of the street-facing west facade, with a CLT planter defining a front entry space and a protruding window offering views to the street while preserving privacy



Exterior view of the southwest corner, with the large south-facing facade characterized by a warm brown wood rainscreen inset and roof-top solar panels



Exterior view of the entry, with black wood rainscreen and black corrugated metal panel siding on the main volume and a warm brown wood rainscreen on the inset entry wall; a CLT planter in the foreground



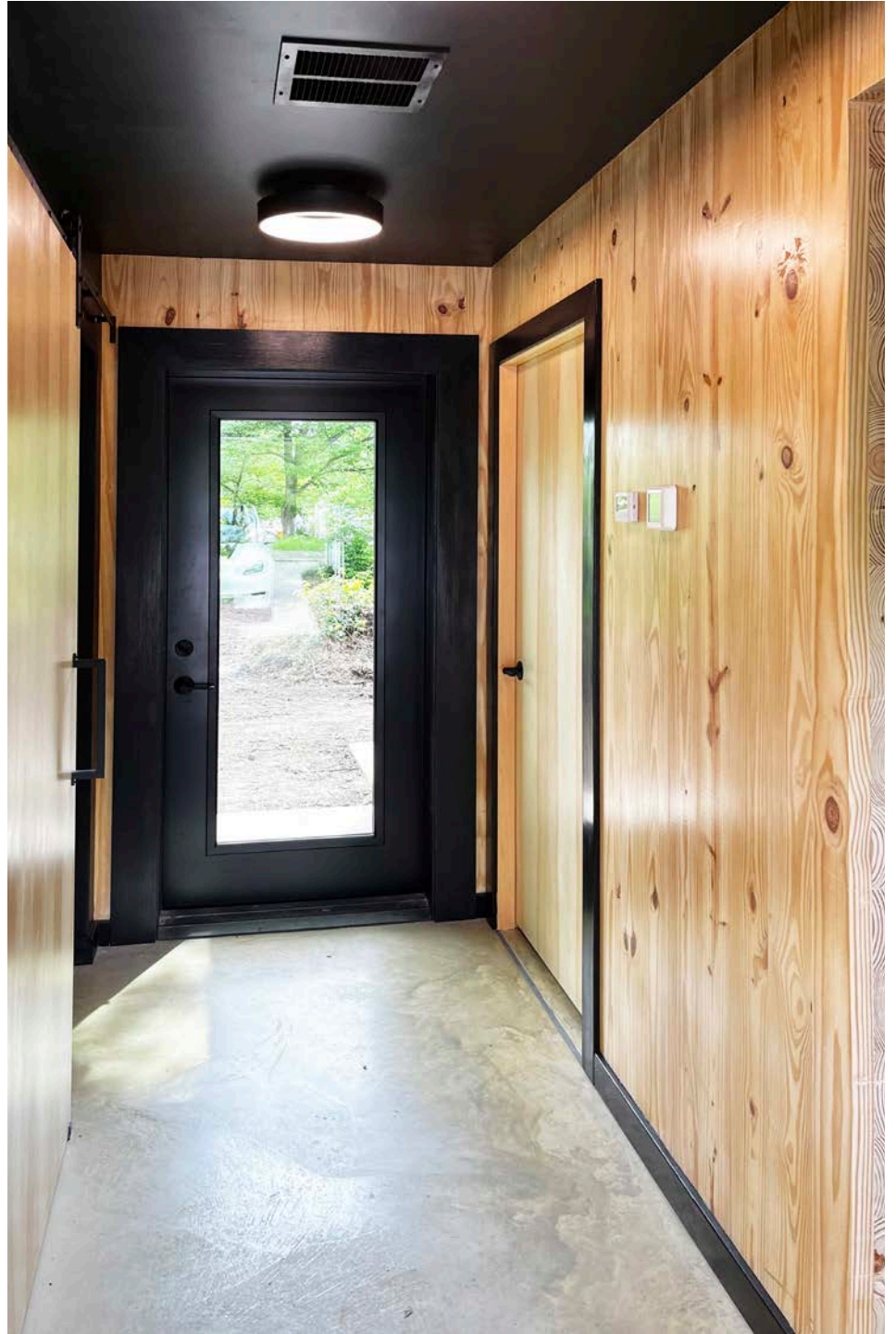
Exterior views of the west gable end and protruding window (top left), of the corrugated wall of the entry area (top right), of the rear, east-facing, facade (bottom left), and the north facade (bottom right)



Interior view of the dining and kitchen area, seen from the living room, with the exposed cross laminated timber shell and exposed radiant-heated concrete floor



Interior view of the dining and living area, seen from the kitchen, with windows facing south and the custom kitchen island in the foreground



Interior view of the north west corner of the living room, with a window facing west to the street (left); interior view of entry passage looking to the back yard (right)



Interior view of the bedroom (left); interior view of the bathroom, looking at west (top right); interior view of the bathroom, looking south, with the shower to the left (bottom right)